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(54) **APPARATUS AND METHOD FOR FILLING A POUCH TYPE PACKAGE**

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(57) **ABSTRACT**

An apparatus for filling a pouch type package with a liquid product, comprising a plurality of stations arranged to consecutively receive and handle the pouch type package, the plurality of stations comprising a filling station for filling the product compartment with the liquid product, a sealing station for sealing the product compartment and comprising a first sealing member arranged to provide the pouch type package with a first seal closing the filling duct, a gas filling station arranged to introduce gas into the handle compartment, and a transfer unit comprising a gripping member for retrieving the package from the gas filling station and
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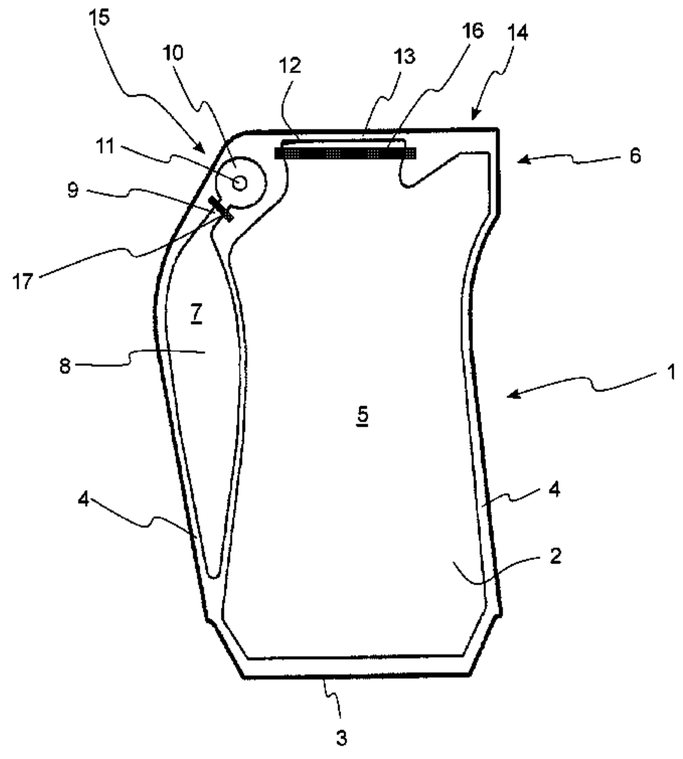

transferring it to a neighboring down-stream situated station. A gas sealing unit (**36**) integrated in the gripping member of the transfer unit, the gas sealing unit (**36**) comprising a second sealing member (**37**) arranged to provide the pouch type package with a second seal entrapping gas introduced into the handle compartment. The invention also relates to a method for filling a pouch type package.

14 Claims, 8 Drawing Sheets

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See application file for complete search history.

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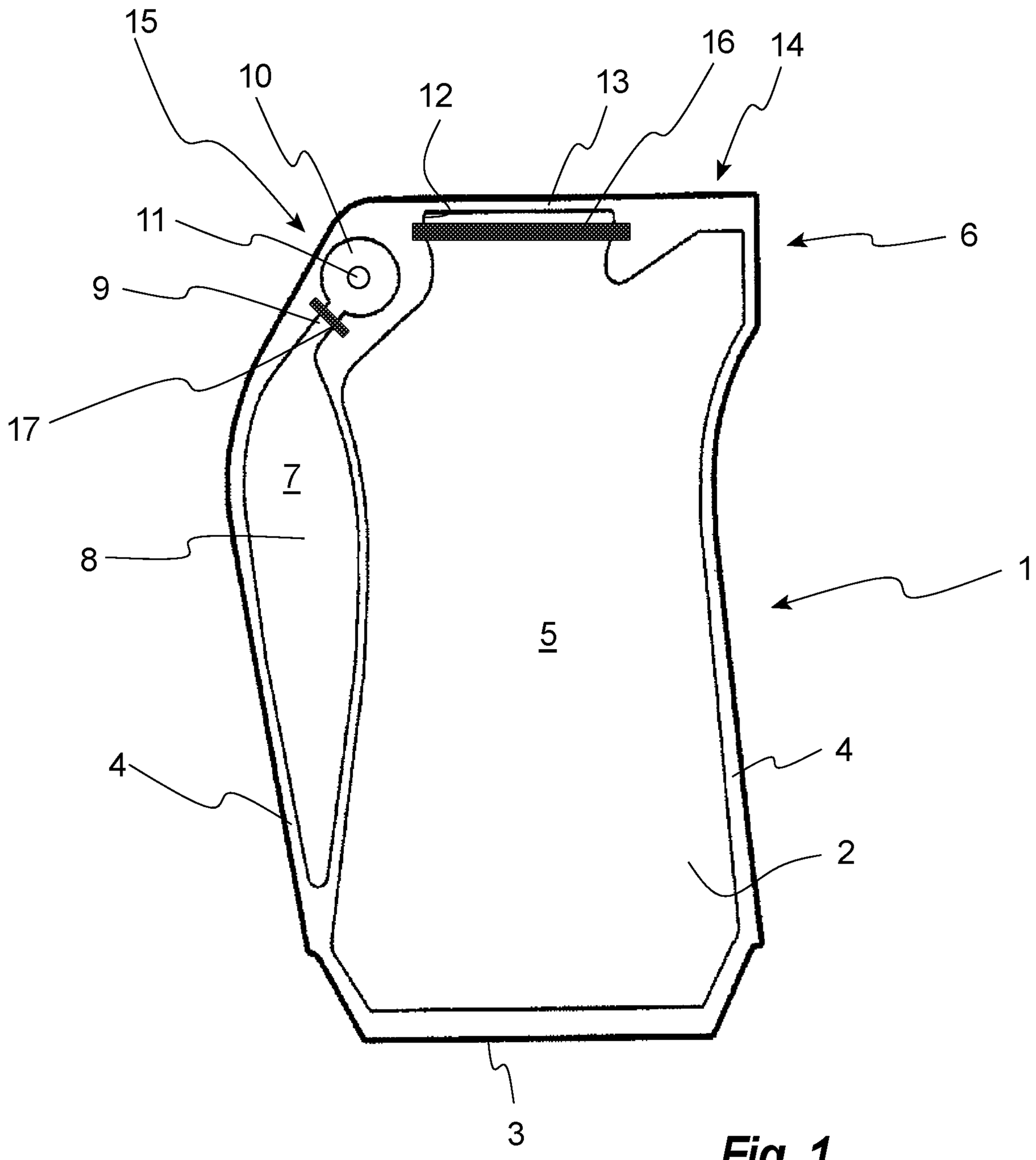

Fig. 1

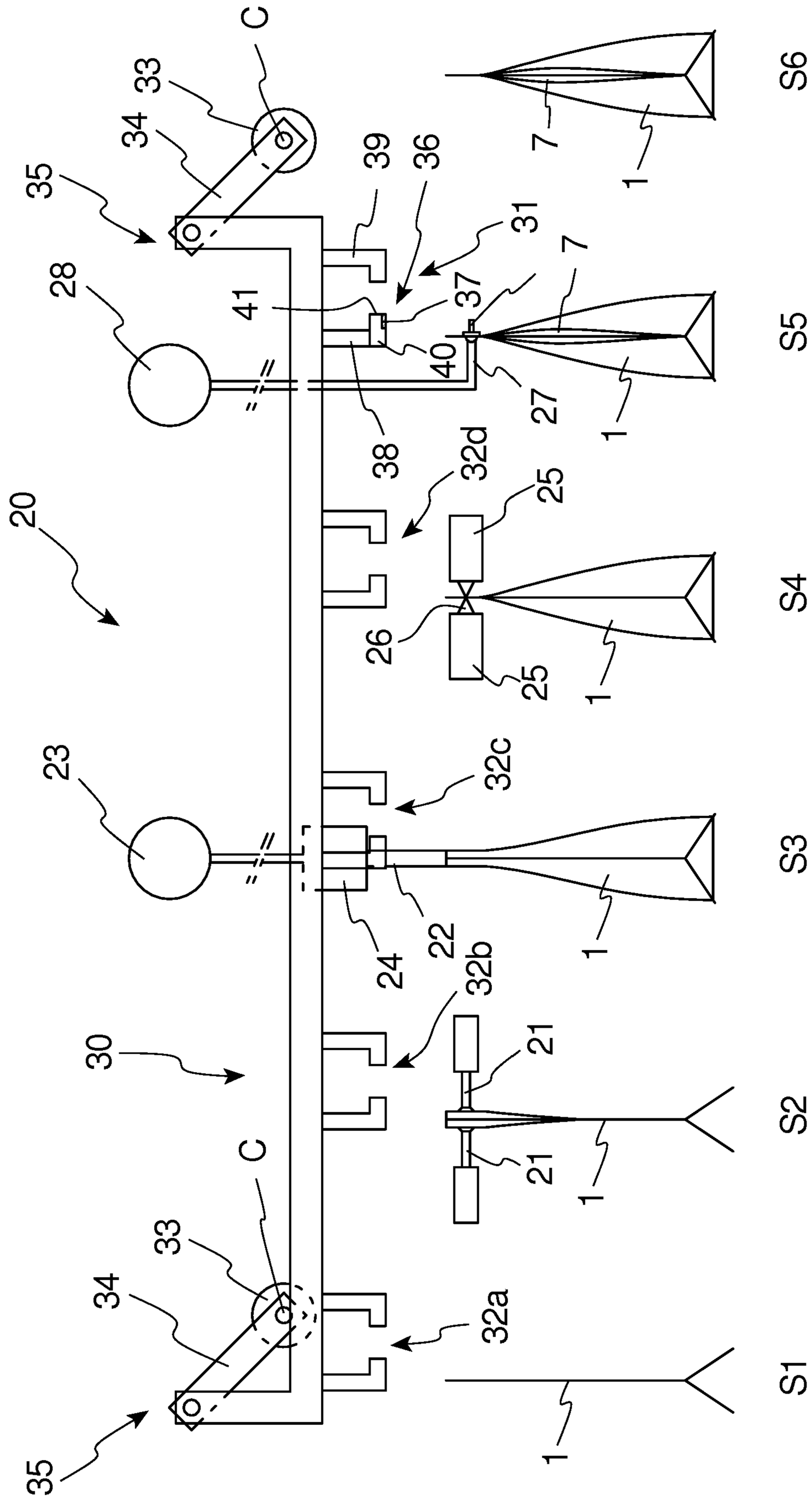
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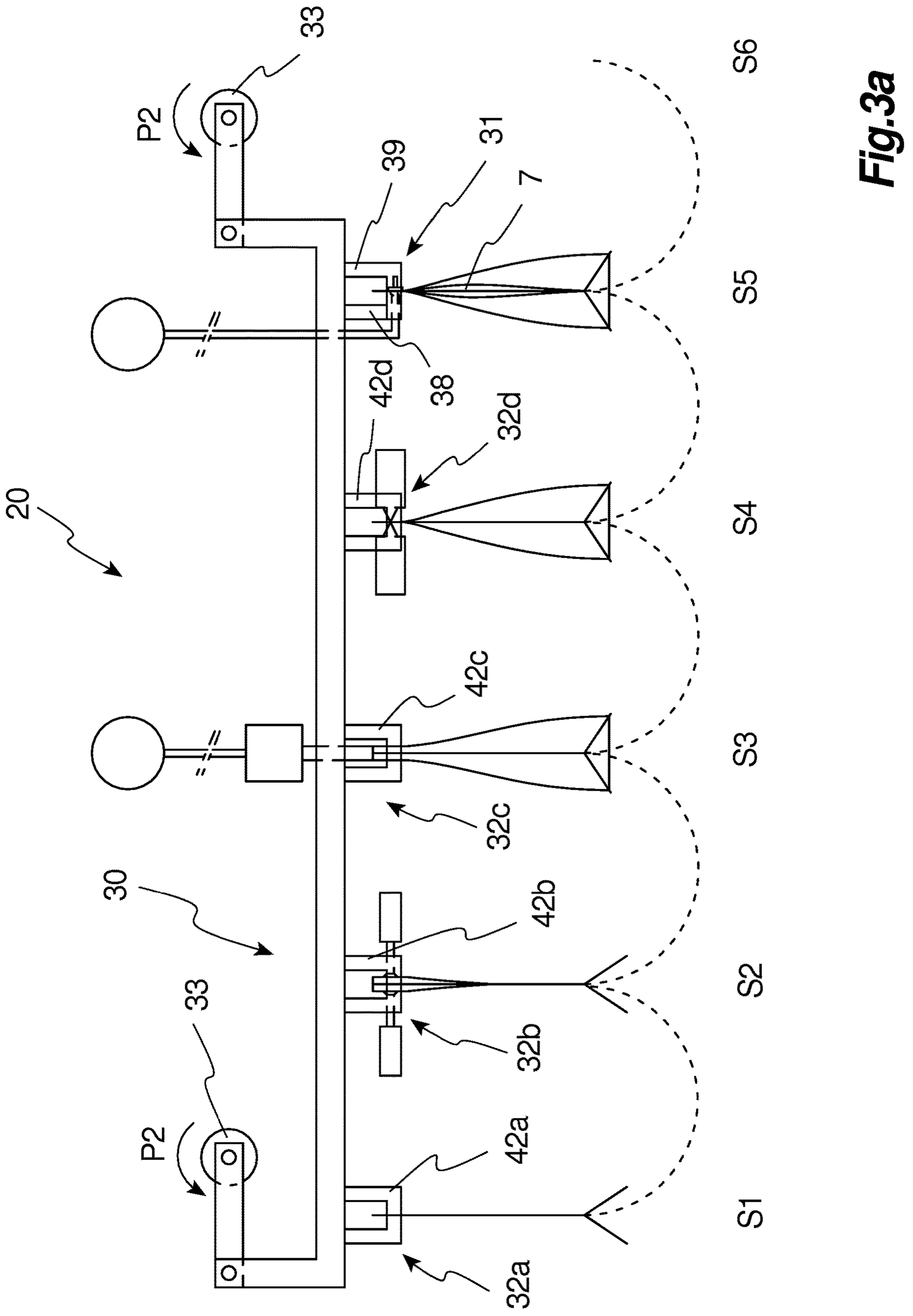
Fig. 2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42d
32d
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P2
42a
32a
S1

Fig.3a

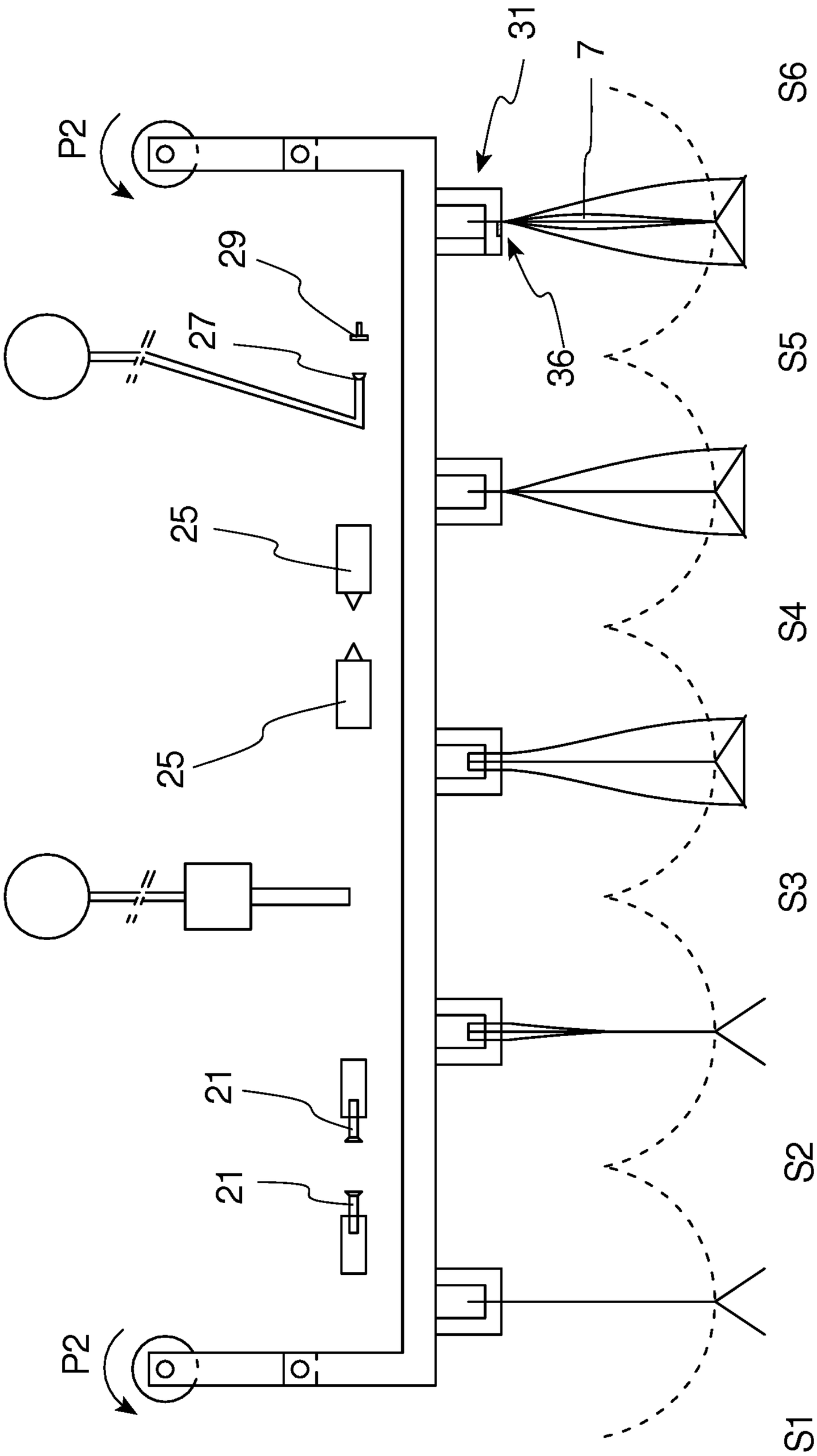


Fig.3b

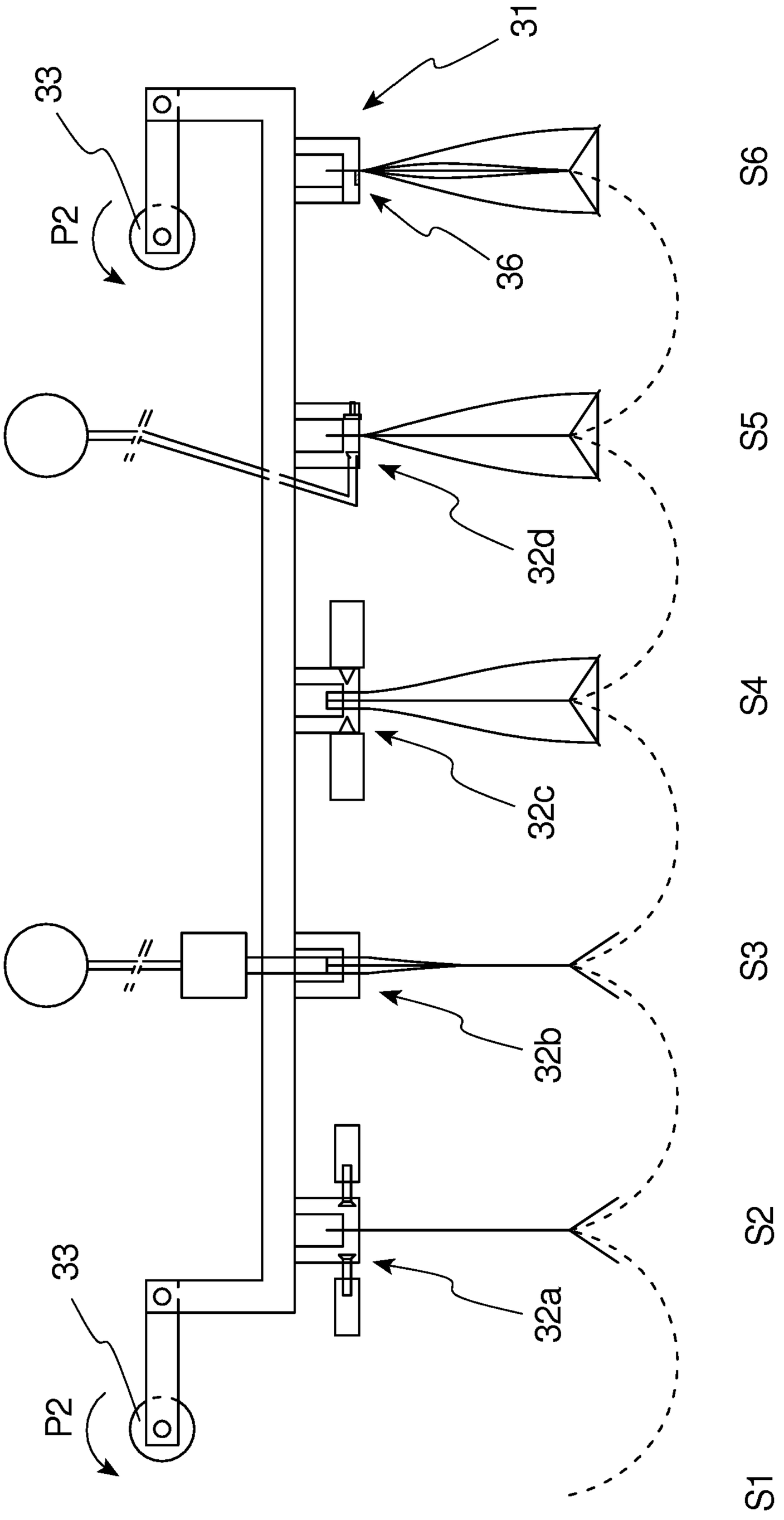


Fig.3c

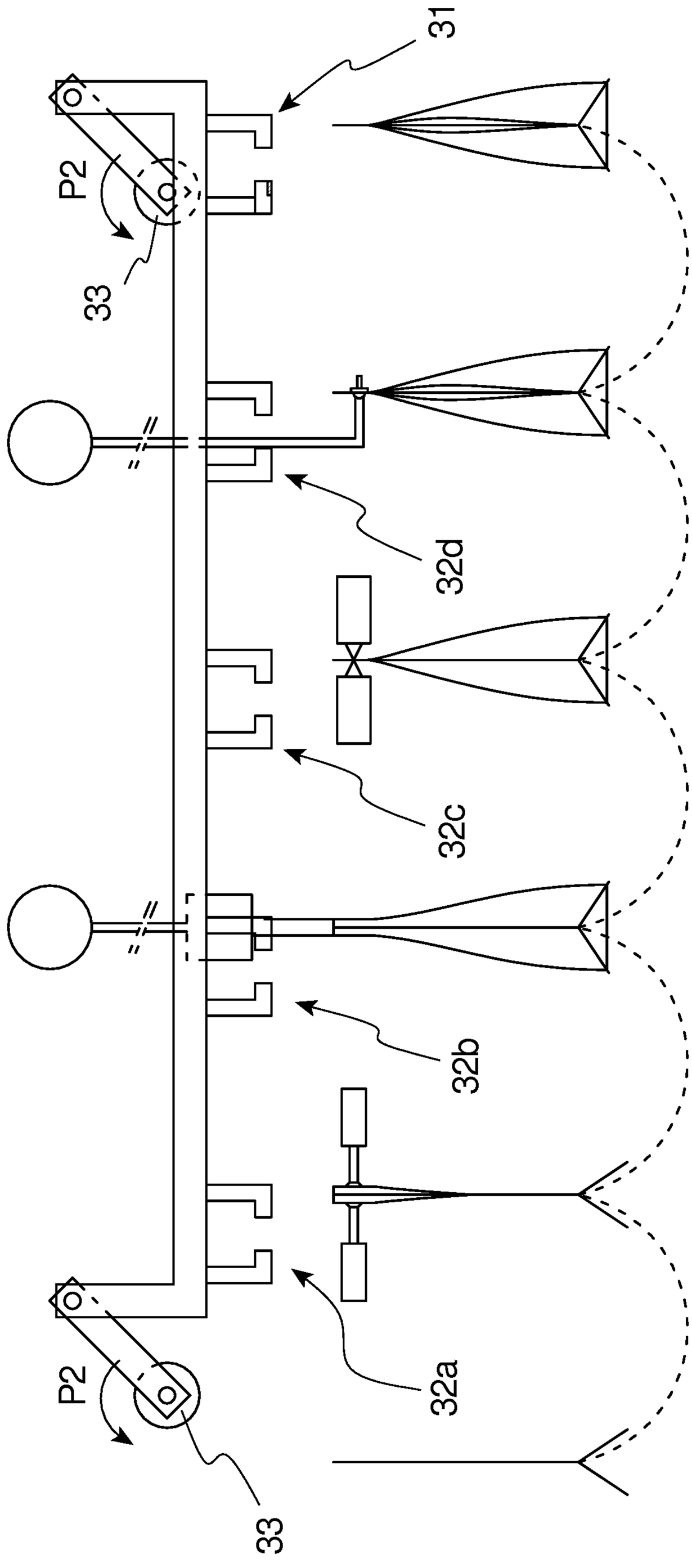
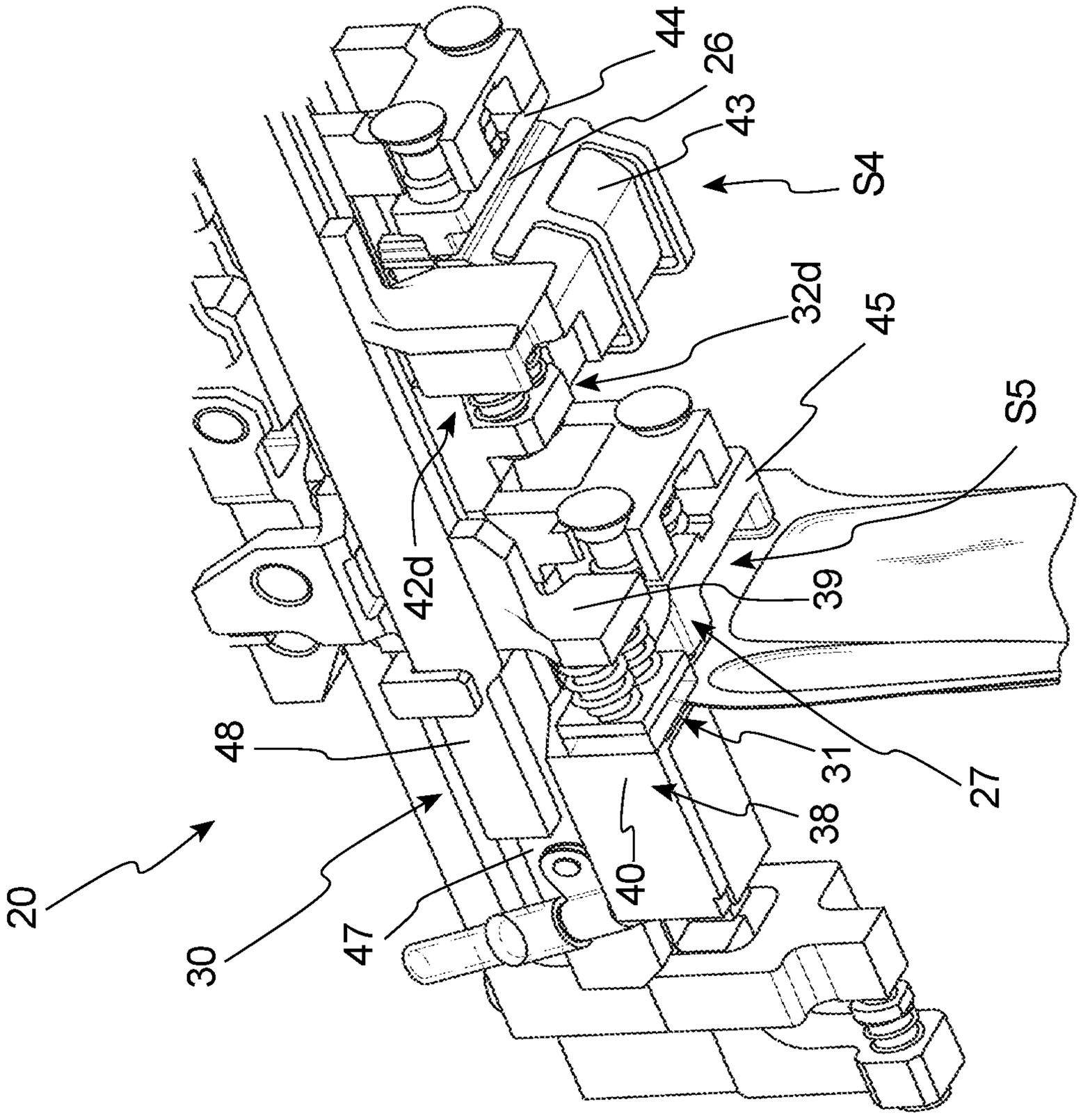


Fig.3d

Fig. 4



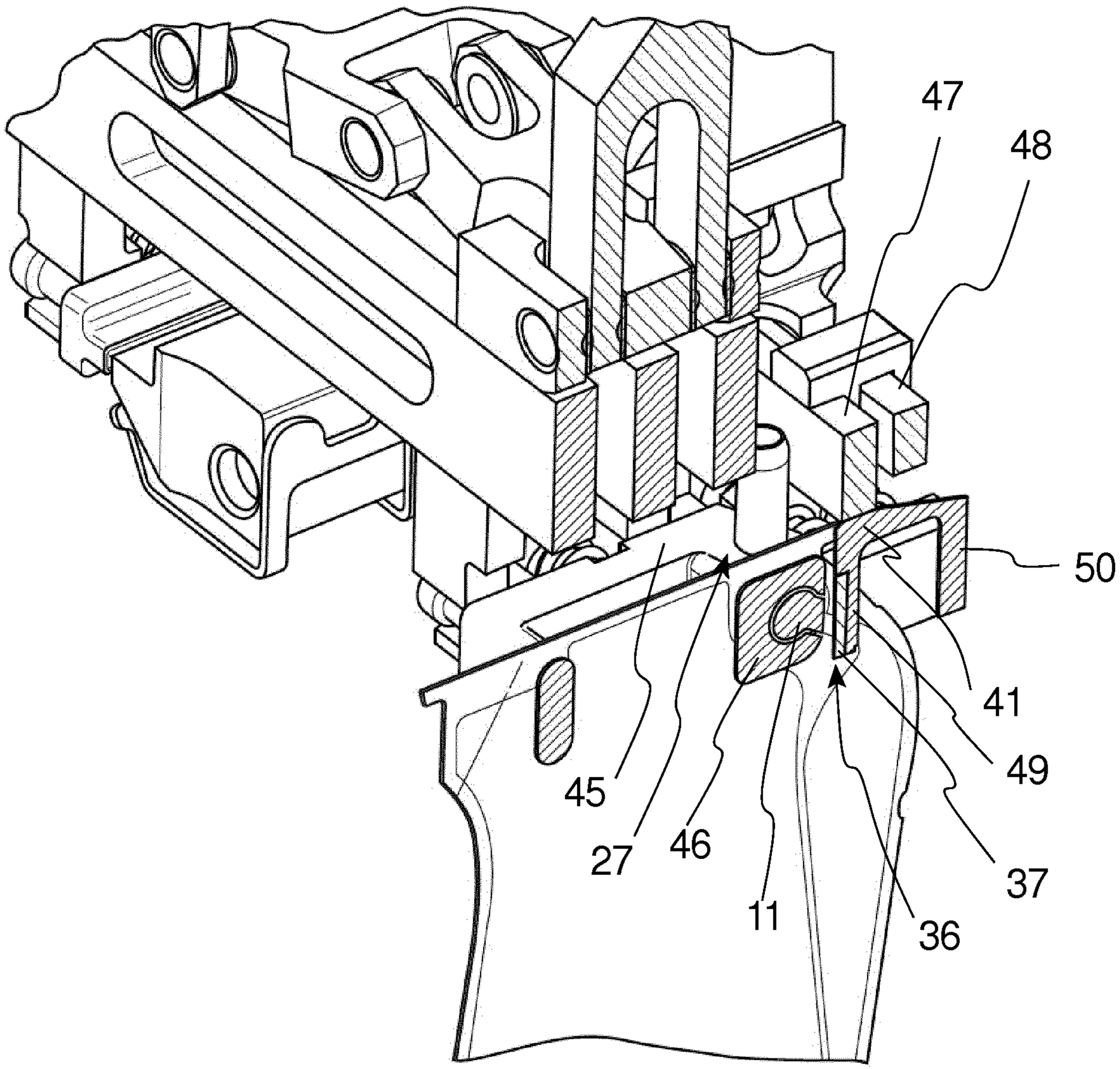


Fig. 5

APPARATUS AND METHOD FOR FILLING A POUCH TYPE PACKAGE

FIELD OF THE INVENTION

The present invention relates to an apparatus and a method for filling a pouch type package, and more specifically filling such a package comprising a handle compartment adapted to be filled with gas.

BACKGROUND ART

It has become increasingly common to package liquid products, in particular liquid food products such as water, milk, juice or wine, in pouch type packages, also referred to as packages of a collapsible type.

By a pouch type package is meant a container having a compartment which is defined by flexible walls and whose volume is dependent on the relative position of the walls. The pouch type package may be of stand-up pouch type having two opposing side walls and a bottom wall.

It is known to manufacture webs consisting of interconnected packages of the type described above rolled onto a bobbin and to arrange such a roll in a filling machine. The web is then fed to the filling machine where the packages are separated from the web and subsequently filled with contents and sealed.

The packages may be provided with a handle compartment adapted to be filled with gas. The gas filled handle compartment provides rigidity to the package and also forms a handle enabling a user to conveniently manage the package.

EP1 7801 29 discloses a filling machine for a pouch type package having a handle compartment adapted to be filled with gas. The filling machine is of a rotary type having a turning table provided with grippers about its periphery. The packages are suspended in the grippers an intermittently conveyed to a plurality of stations, such as a bag mouth opening station, a filling station, a gas filling station and a sealing station for the product compartment and the handle.

EP220081 7 discloses another type of filling machine for a pouch type package. The filling machine disclosed therein comprises a section through which the packages are fed intermittently by means of an array of cyclic movable grippers in a broad wise direction to a plurality of stations such as a filling duct opening station, a filling station, a sealing station for the product compartment, a gas filling station and a sealing station for the handle.

The provision a pouch type package having a handle compartment adapted to be filled with gas consequently requires that the filling machine is equipped with means for enabling the gas filling operation. This may result in that the filling machine becomes bulky, and there thus exists a need for a more compact filling machine capable of gas filling a handle compartment of the pouch type package.

SUMMARY OF THE INVENTION

In view of that stated above, the object of the present invention is to provide an improved apparatus and method for filling a pouch type package having a handle compartment adapted to be filled with gas.

It is also an object to provide such an apparatus and method enabling an improved utilization of space.

To achieve at least one of the above objects and also other objects that will be evident from the following description, a device having the features defined in claim **1** and a method having the features defined in claim **9** are provided according to the present invention. Preferred embodiments of the device and method will be evident from the dependent claims.

More specifically, there is provided according to a first aspect of the present invention an apparatus for filling a pouch type package with a liquid product, the pouch type package comprising two flexible opposing side walls defining a product compartment communicating with the environment via a filling duct and a separate handle compartment communicating with the environment via a gas inlet arranged in one of the two side walls, wherein the product compartment is adapted to be filled with the liquid product through the filling duct and wherein the handle portion is adapted to be filled with gas through the gas inlet, the apparatus comprising a plurality of stations arranged to consecutively receive and handle the pouch type package, the plurality of stations comprising a filling station for filling the product compartment with the liquid product and comprising a filling tube insertable into the filling duct of the pouch type package, a sealing station for sealing the product compartment after having been filled with the liquid product and comprising a first sealing member arranged to provide the pouch type package with a first seal closing the filling duct, a gas filling station arranged to introduce gas into the handle portion for inflation thereof and comprising a nozzle applicable over the gas inlet, and a transfer unit comprising a gripping member for retrieving the package from the gas filling station and transferring it to a neighboring down-stream situated station. A gas sealing unit is integrated in the gripping member of the transfer unit, the gas sealing unit comprising a second sealing member arranged to provide the pouch type package with a second seal entrapping gas introduced into the handle compartment.

Hereby an improved apparatus for filling a pouch type package is provided. Since the gas sealing unit is integrated in the gripping member of the transfer unit, the conventional gas sealing station situated down-stream of the gas filling station may be dispensed with. As a consequence, the apparatus may be made more compact enabling an improved utilization of space. Further, commencing sealing of the handle compartment immediately when the package is retrieved from the gas filling station and completing the sealing during the transfer to the neighboring down-stream situated station makes the conventional step of blocking the gas filled handle compartment while the package is being moved to a gas sealing station unnecessary which eliminates the risk of gas leaking out of the handle compartment.

According to an embodiment of the inventive apparatus, the gripping member of the transfer unit may comprise a pair of jaws arranged to pinch an upper portion of the pouch type package for retrieval thereof. The pair of jaws may comprise a first jaw having a thermally non-conductive engagement member, wherein the second sealing member is recessed in an engagement surface of the engagement member. Hereby it is ensured that a well defined second seal may be provided by the second sealing member. The engagement surface may comprise a an first engagement portion adjoining the second sealing member, the first engagement portion being arranged to face the pressurized side of the handle compartment while the second sealing member engages the package in order to provide the second seal. Hereby it is ensured that the second seal in not exposed while being formed to the pressurized gas inside the handle compartment.

According to another embodiment of the inventive apparatus, the transfer unit may comprise an additional gripper arranged to transfer the pouch type package from a station

situated up-stream or down-stream of the gas filling station to a neighboring down-stream situated station. The provision of a transfer unit comprising additional grippers facilitates synchronized transfer of packages from up-stream situated stations to down-stream situated stations.

According to yet another embodiment of the present invention, the sealing station and the gas filling station may be separate stations or integrated in a single station.

According to yet another embodiment, each of the plurality of stations may be arranged for parallel handling of a group of packages comprising at least two pouch type packages. Parallel handling of packages may increase the production capacity of the inventive apparatus. The gripping member of the transfer unit may in this context be arranged to grip an upper back portion comprising said inlet of the package as well as an upper front portion of a package being handled in parallel. The use of a single gripping member for engagement with two packages handled in parallel may improve the compactness of the apparatus.

According to another aspect of the present invention, a method for filling a pouch type package with a liquid product is provided, the pouch type package comprising two flexible opposing side walls defining a product compartment communicating with the environment via a filling duct and a separate handle compartment communicating with the environment via a gas inlet arranged in one of the two side walls, wherein the product compartment is adapted to be filled with the liquid product through the filling duct and wherein the handle portion is adapted to be filled with gas through the gas inlet, the method comprising filling the product compartment with a liquid product at a filling station in which a filling pipe is inserted into the filling duct of the pouch type package, transferring the pouch type package with its product compartment filled with a liquid product from the filling station to a sealing station, providing the pouch type package with a first seal closing the filling duct at the sealing station, transferring the package from a neighboring up-stream situated station to a gas filling station, introducing gas into the handle compartment for inflation thereof at the gas filling station by means of a nozzle applied over the gas inlet of the pouch type package, and providing the pouch type package with a second seal entrapping gas introduced into the handle compartment at the gas filling station. The method further comprises transferring the package from the gas filling station to a neighboring down-stream situated station, wherein the step of providing the pouch type package with a second seal is performed by means of a gas sealing unit integrated in a gripping member of a transfer unit during the step of transferring the package from the gas filling station to the neighboring down-stream situated station.

According to an embodiment of the inventive method, the neighboring up-stream situated station from which the pouch type package is transferred to the gas filling station may be the sealing station.

According to another embodiment, the neighboring down-stream situated station to which the pouch type package is transferred from the gas filling station may be an output station.

According to yet another embodiment, the second seal may be provided such on the pouch type package that in extends across a third segment of the handle compartment, the third segment being arranged between a first segment of the handle compartment forming a handle in the inflated state of the handle compartment and a second segment comprising said inlet.

The details and advantages of the second aspect of the invention are largely analogous to those of the first aspect of the invention, wherein reference is made to the above.

Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, component, means, step, etc]" are to be interpreted openly as referring to at least one instance of said element, device, component, means, step, etc., unless explicitly stated otherwise. The steps of any method disclosed herein do not have to be performed in the exact order disclosed, unless explicitly stated.

BRIEF DESCRIPTION OF THE DRAWINGS

The above, as well as additional objects, features and advantages of the present invention, will be better understood through the following illustrative and non-limiting detailed description of preferred embodiments of the present invention, with reference to the appended drawings, where the same reference numerals will be used for similar elements, wherein:

FIG. **1** is a plan view of a pouch type package for use together with the inventive apparatus and method.

FIG. **2** is a schematic side view of an embodiment of the inventive apparatus.

FIGS. **3***a*-**3***d* is schematic side views illustrating the operation of the apparatus shown in FIG. **2**.

FIG. **4** is a perspective view of a part of an embodiment of the inventive apparatus.

FIG. **5** is a partially sectioned perspective view of the apparatus shown in FIG. **4**.

DESCRIPTION OF EMBODIMENTS

The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which currently preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided for thoroughness and completeness, and fully convey the scope of the invention to the skilled person.

With reference to FIG. **1**, an example of a pouch type package **1** in the form of a stand-up pouch is shown to which the device and method in accordance with the present invention may be applied. The pouch type package may be used as a pre-made package adapted to be filled and sealed in a filling machine. Alternatively, the package may be produced fully or in part in the filling machine. The pouch type package may also be referred to as a package of collapsible type.

The pouch type package is especially intended for products in the form of liquid foodstuffs such as milk, water, fruit drinks, juice or wine, but it may, of course, also be intended for products in some other form or for other purposes.

The pouch type package disclosed comprises three flexible walls, two of which constitute side walls **2** and the third constitutes a bottom wall **3**. The walls are joined along connecting portions **4** to define a product compartment **5**. The walls **2**,**3** are made of a bendable and flexible material, which means that the volume of the product compartment **5** depends on the relative distance between the walls **2**,**3**. The volume of the product compartment **5** is thus directly dependent on the filling ratio of the package **1**. In other words, the package is of a collapsible type.

The walls **2**,**3** of the package **1** are preferably joined in the connecting portions **4** by welding or sealing. Also other methods of joining, such as gluing, are conceivable.

The shown package **1** has at its upper front end an opening portion **6** which is formed as a spout. To open the container **1**, an outer end of the opening portion **6** is separated, thereby making the product compartment **5** communicate with the environment. The outer end can be separated, for example, by cutting or tearing off. The package **1** may thus in its filled state be emptied in a pouring motion like when handling a jug. The contents of the package may of course be consumed in other ways, for example by means of a straw inserted through the spout of the package or through the side wall of the package.

The package material may be a multilayered plastic film material and may comprise a core layer of mineral-based filler and a binder of polyolefin. It will be appreciated that also other materials and layers are possible, such a gas barrier layer or a light barrier layer.

At the rear end of the pouch type package **1**, a handle compartment **7** intended to be filled with gas in order to form a handle is shown. The handle compartment **7** is defined by the two side walls **2** and a peripheral connecting portion **4**.

The handle compartment **7** is divided into three segments which all communicate with each other. The first segment **8** comprises the part that is intended to form the actual handle. The first segment **8** thus is the segment which in the completed package gives the desired function. A third segment **9** is directly connected to the first segment **8** and constitutes a narrow duct. A second segment **10** is directly connected to the third segment **9**. The second segment **10** consists in its simplest form of an area defined by a portion of the two opposed side walls **2** with an inlet **11** in the form of a hole in one side wall **2**. The inlet **11** thus constitutes an entry to the handle compartment **7**, through which inlet **11** the handle compartment **7** communicates with the environment before being filled with gas and sealed.

As mentioned above, the third segment **9** constitutes a narrow duct. Its main function is to form a surface over which a means for sealing of the duct after completion of the gas filling can be arranged. The cross-sectional area of the third segment **9** is significantly smaller than the cross-sectional area of the first segment **8**. By cross-sectional area is in this case meant the area that can be made up by the side walls between them transversely to the longitudinal direction of the duct.

The third **9** and the second segment **10** of the handle compartment **7** may on their insides be provided with an embossed surface (not shown). The embossed surface may facilitate separation of the associated side wall portions in connection with gas filling.

The handle compartment **7** with the three segments **8**, **9**, **10** is in the shown embodiment oriented in such a manner that the second segment **10** is arranged adjacent to the upper back portion **15** of the container **1**. However, it will be appreciated that the handle compartment **7** can be arranged as desired.

As mentioned above, the handle compartment **7** is intended to be filled with gas in order to form a handle of the container. By gas is preferably meant air, but of course also other gases may be used. The handle compartment **7** has such a geometry and filling ratio as to form an easy-to-grip handle in inflated state. Such a handle may also promote by its geometry and gas filling a considerable rigidity of the container **1**.

The package **1** has centrally in its upper part a filling duct **12** through which the product compartment **5** of the package **1** may be filled with a product. When the package **1** is provided as a blank, as in the shown embodiment, for a filling machine, the filling duct **12** may be closed by an end closure **13** which has to be removed prior to filling. After completion of the filling, the filling duct **12** is once more sealed with a first seal indicated at **16**.

The handle compartment is as described above intended to be sealed after inflation thereof which is illustrated by a second seal indicted at **17**. The pouch type package may be supplied to a filling machine in a pre-made state and included in a web consisting of interconnected packages. The web may be wound up on a bobbin. The web may be fed into the filling machine, where the packages are separated from the web and filled.

The packages may initially be fed in an edge wise direction while the end closure **13** is removed and the packages are separated. The feeding in the edge wise direction may be intermittent or continuously.

After removal of the end closure **13** and separation of the packages, the packages may be fed in a broad wise direction in a section of the filling machine intended for filling of the package **1**. The feeding in broad wise direction may be intermittent. For the feeding in the broad wise direction, a transfer unit may be provided and arranged for gripping the package in an upper front portion indicated at **14** and in the upper back portion indicated at **15**.

In FIG. **2**, to which reference now is made, an apparatus **20** according to an embodiment of the present invention for filling a pouch type package **1** is schematically shown. The shown embodiment of the inventive apparatus **20** represents such a section described above intended for filling of packages being intermittently fed in a broad wise direction.

The inventive apparatus **1** may comprise a plurality of stations, each of which may comprise not shown grippers for holding the package at the associated station. It should be realized that the stations may be integrated in the grippers.

In the shown embodiment, the plurality of stations comprises: an input station S**1** for receiving packages fed to the apparatus, for instance from a section of the filling machine in which section the packages have been fed in an edge wise direction; an opening station S**2** for opening-up of the filling duct of the packages; a filling station S**3** for filling of the product compartment of the packages; a sealing station S**4** for sealing the filled product compartment of the packages; a gas filling station S**5** for inflating the handle compartment of the packages; and an output station S**6** form which the packages is transferred for subsequent handling. A package **1** of the type described above with reference to FIG. **1** is shown at each station.

The opening station S**2** may comprise a pair of suction cups **21** arranged to engage the opposing side wall portions defining the filling duct **12** and to separate the opposing side wall portions by separation of the suction cups **21**.

The filling station S**3** may comprise a filling tube **22** which is connected to a liquid product source **23** via a product valve **24**. The filling tube **22** is insertable into the filling duct **12** of the package **1** once the filling duct **12** has been opened-up in the preceding opening station S**3**.

The sealing station S**4** may comprise a pair of sealing jaws **25**, of which at least one comprises a first sealing member **26**, which may be permanently heated. The sealing jaws **25** may be arranged to engage a package **1** situated at the sealing station S**3** such that the first sealing member **26** provides the package with the first seal **16** closing the filling duct **12** once the product compartment **5** has been filled in the preceding filling station S**3** and thereby to seal the

product compartment **5**. The sealing jaws **25** may be integrated in, or form, the gripper holding the package **1** at the sealing station S**4**.

The gas filling station S**5** comprises in the shown embodiment a nozzle **27** connected to a source **28** of pressurized gas and an abutment **29** against which the nozzle **27** is movably arranged in order to clamp a package **1** and to apply the nozzle **27** over the inlet **11** of the handle compartment **7**. The nozzle **27** and the abutment **29** may be integrated in the gripper holding the package at the gas filling station S**5**.

It should be realized that the stations may be designed differently and since the specific design of the stations is not the focus of the present invention; these stations will not be described in detail.

The inventive apparatus **20** further comprises a transfer unit **30**. The shown embodiment of the transfer unit **30** is arranged to transfer the packages **1** intermittently in a broad wise direction in the direction indicated by arrow P**1** and are arranged for gripping the packages **1** in the upper front portion **14** and in the upper back portion **15**.

The transfer unit comprises a gripping member **31** for retrieving a package **1** from the gas filling station S**5** and transferring it to a neighboring down-stream situated station, which in the shown embodiment is the output station S**6**.

In the shown embodiment, the transfer unit **30** further comprises additional grippers arranged to retrieve and transfer packages from stations situated up-stream of the gas filling station S**5** to a neighboring down-stream situated station.

Thus, in the shown embodiment, the additional grippers comprise a first additional gripper **32***a* for retrieving a package **1** from the input station S**1** and transferring it to the opening station S**2**; a second additional gripper **32***b* for retrieving a package **1** from the opening station S**2** and transferring it to the filling station S**3**; a third additional gripper **32***c* for retrieving a package **1** from the filling station S**3** and transferring it to the sealing station S**4**; and a fourth additional gripper **32***d* for retrieving a package **1** from the sealing station S**4** and transferring it to the gas filling station S**5**.

The transport unit **30** is carried by rotatable mounts **33**. Each mount **33** comprises an arm **34**, which at its end **35** facing away from the centre of rotation C of the mount **33** is pivotally carried in bearings in the transport unit **30**. This allows a circular motion to be imparted to the transport unit **30** and, more specifically, each of the additional grippers **32***a-d* and the gripping member **31** to be cyclically moved along a circular, endless path between a pick-up position and delivery position.

Each of the gripping member **31** and the additional grippers **32***a-d* may comprise a pair of jaws **42***a-d* which jaws are movable against each other in order to pinch the upper back portion **15** of the package. Additional pairs of jaws (not shown) may be arranged to pinch the upper front portion **14** of the package.

The transfer unit **30** may for instance comprise pneumatic, hydraulic and/or mechanic means (not shown) for operation of the pairs of jaws. In the figure, the pairs of jaws are shown in an open position.

The gripping member **31** may further comprise a gas sealing unit **36** integrated therein. The gas sealing unit **36** comprises a second sealing member **37** arranged to provide the pouch type package **1** with a second seal **17** entrapping gas introduced into the handle compartment **7** which gripping member **31** retrieves and transfers the package **1** from the gas filling S**5** station to the neighboring down-stream situated station which in the shown embodiment is the output station S**6**.

The pair of jaws **38**, **39** of the gripping member **31** may comprise a first jaw **38** having a thermally non-conductive engagement member **40** which for instance may be made of polyether ether ketone (PEEK). The engagement member **40** defines an engagement surface **41** in which the second sealing member **37** is recessed. The second sealing member **37** is located such in the engagement surface **41** that the second seal **17** provided by the second sealing member **37** when the jaws **38**, **39** of the gripping member **31** pinches the upper back portion **15** of the package **1** extends across the third segment **9** of the handle compartment **7**.

Hereafter, the operation of the transfer unit **30** will be described with reference to FIGS. **3***a*-**3***d*.

In FIG. **3***a*, the transfer unit **30** has been operated by rotation of the mounts **33** such that additional grippers **32***a-d* and the gripping member **31** have been brought along a respective circular path to the associated u p-stream station. Also, the pairs of jaws have been moved to a closed position in order to pinch an upper back portion **15** of the package **1** located at the respective station. As mentioned above, additional pairs of jaws (not shown) are provided for pinching the upper front portion **14** of the packages **1**.

Thus, the pair of jaws **42***a* of the first additional gripper **32***a* has retrieved an unfilled package provided in a flat state **1** and located at the input station S**1**; the pair of jaws **42***b* of the second additional gripper **32***b* has retrieved a package **1** having an opened-up filling duct **12** and located at the opening station S**2**; the pair of jaws **42***c* of the third additional gripper **32***c* has retrieved a package **1** having been filled with liquid contents and located at the filling station S**3**; the pair of jaws **42***d* of the fourth additional gripper **32***d* has retrieved a package **1** having been provided with the first seal **16** closing the filling duct **12** and located at the sealing station S**4**; and the pair of jaws **38**, **39** of the gripping member **31** has retrieved a package **1** having a gas filled handle compartment **7** and located at the gas filling station S**5**.

In FIG. **3***b*, the mounts **33** have been rotated in the direction indicated by arrows P**2**, whereby the each retrieved package **1** is being transferred towards the associated neighboring down-stream situated station along a respective circular path of movement. As indicated, the stations have been operated in order to allow the respective package to be retrieved and also to allow a new package to be received. Thus, the suction cups **21** have been deactivated and separated; the sealing jaws **25** have been separated; and the nozzle **27** has been separated from the abutment **29**. As described above, while the gripping member **31** transfers the package **1** from the gas filling station S**5** to the output station S**6**, the gas sealing unit **36** integrated in the gripping member **31** provides the package **1** with a second seal **17** entrapping gas introduced into the handle compartment **7**.

In FIG. **3***c*, the mounts **33** have been continuously rotated in the P**2** direction in order to position the additional grippers **32***a-d* and the gripping member **31** at the associated down-stream situated stations. Thus, the first additional gripper **32***a* has been brought to the opening station S**2**; the second additional gripper **32***b* has been brought to the filling station S**3**; the third additional gripper **32***c* has been brought to the sealing station S**4**; the fourth additional gripper **32***d* has been brought to the gas filling station S**5**; and the gripping member **31** has been brought to the output station S**6**. At the

respective station, the not shown grippers may then be activated for holding the package **1** transferred to the respective stations.

Further, the second seal **17** provided by the gas sealing unit **36** integrated in the gripping member **31** is completed when the package **1** transferred by said gripping member **31** reaches the output station S**6**.

When the not shown grippers have been activated for holding the packages at the respective stations, the additional grippers **32***a-d* and the gripping member **31** may be opened thereby completing the transfer and delivery of the associated packages.

By continued rotation of the mounts in the P**2** direction, as shown in FIG. **3***d*, the additional grippers **32***a-d* and the gripping member **31** may be moved towards the associated pick-up position in order to initiate a new retrieval-transfer-delivery cycle while the associated operation is carried out at the respective station. As seen, a new package a have been provided at the input station S**1**.

It should be realized that each station of the inventive apparatus may be arranged for parallel handling of two or more packages. Thus, the pairs of jaws of the additional grippers and the gripping member may be arranged to, in addition to pinching the upper back portion **15** of the packages **1** shown in FIGS. **3***a*-**2***d*, also pinch the upper front portion **14** of a group of packages handled in parallel sections of the stations.

In FIGS. **4** and **5**, to which reference now are made, a part of an embodiment of the inventive apparatus **20** is shown more in detail.

In the shown part of the apparatus **20**, the sealing station S**4** and the gas filling station S**5** are illustrated as well as a part of transfer unit **30** comprising the fourth additional gripper **32***d* arranged for transferring a package **1** from the sealing station S**4** to the gas filling station S**5** and the gripping member **31** arranged for transferring a package **1** from the gas filling station S**5** to a neighboring down-stream situated station. In the shown embodiment, the gripping member **31** and the fourth additional gripper **32***d* are arranged for pinching the upper back portion **15** of the packages **1**, but it is understood that the transfer unit **30** also may arranged for pinching the upper front portion **14** of the packages **1** in order to establish a reliable grip of the packages **1**. To this end the transfer unit may comprise an arrangement of gripping members and additional grippers corresponding to those that will be described below and arranged at the opposing side of the sealing station and gas filling station.

A pouch type package **1** is shown located at the gas filling station S**5**. No package is shown at the sealing station S**4** for sake of clarity.

In the figures, the filling of gas into the handle compartment **7** has been completed, and the gripping member **31** has retrieved the package **1** by pinching the upper back portion **15** of the package **1**. Subsequently, the grippers holding the packages at the stations will be opened and the transfer of the packages to a down-stream situated station will commence.

The sealing station S**4** comprises two jaws **43**, **44** having been brought together in order to provide a first seal **16** closing the filling duct **12** of the non-shown package. More specifically, the sealing station S**4** comprises a first sealing member **26** integrated in at least a first jaw **43** of the jaws. The first sealing member **26** may be permanently heated. A second jaw **44** of the jaws may be an abutment jaw having a seal defining engagement section against which the first jaw **43** and the first sealing member **26** integrated therein are pressed. The pair of jaws **43**, **44** also constitutes the gripper for holding the not shown package at the sealing station S**4**.

The gas filling station S**5** comprises a gripper for holding the package in the form of a pair of jaws **45**, **46** of which only the first jaw **45** is shown in the FIG. **4**. In FIG. **5**, the second jaw is indicated at **46**. A nozzle **27** is integrated in the first jaw **45**. The nozzle **27** is arranged such that it is positioned above the inlet **11** of the third section **9** of the handle compartment **7**, which is clearly seen in the partially sectioned view shown in FIG. **5**. The second jaw **46** of the pair of jaws forms an abutment against which the first jaw **45** and the nozzle **27** integrated therein are pressed during the gas filling operation.

The transfer unit **30** comprises in the shown embodiment a first and a second bar **47**, **48** arranged in parallel and supporting the gripping member **31** and the fourth additional gripper **32***d*. The bars **47**, **48** are connected to arms (not shown) rotatable by mounts (not shown) as disclosed above. Rotation of the arms by means of said mounts will move the fourth additional gripper **32***d* and the gripping member **31** from the sealing station S**4** and the gas filling station S**5**, respectively, to the associated down-stream situated station, i.e. the gas filling station S**5** and an output station (not shown), respectively.

The fourth additional gripper **32***d* comprises a pair of jaws **42***d*, wherein a first jaw of said pair of jaws **42***d* is supported by the first bar **47** and a second jaw of said pair of jaws **42***d* is supported by the second bar **48**. Correspondingly, the gripping member **31** comprises a first jaw **38** supported by the first bar **47** and a second jaw **39** supported by the second bar **48**. The gripping member **31** and the fourth additional gripper **32***d* are opened and closed by means of relative displacement of the bars **47**, **48** in the longitudinal direction thereof. In the shown embodiment, the bars **47**, **48** have been displaced such that the gripping member **31** and the fourth additional gripper **32***d* have been closed, i.e. the pairs of jaws have been moved against each other, thereby pinching the upper back portion **15** of the packages **1**.

A gas sealing unit **36** is integrated in the gripping member **31** for provision of the second seal **17** entrapping gas introduced into the handle compartment **7**. To this end, the gas sealing unit **36** comprises a second sealing member **37** arranged in the first jaw **38** of the gripping member **31**.

More specifically, the first jaw **38** of the gripping member comprises a thermally non-conductive engagement member **40** which is movable against the second jaw **39** in order to pinch the package **1**. The second sealing member **37** is recessed in an engagement surface **41** of the engagement member **40**, which may be clearly seen in FIGS. **4** and **5**. In those figures it may also be seen that a section of the engagement surface **41** adjoining the second sealing member **37** forms a first engagement portion **49** which faces the pressurized side of the gas filled handle compartment **7** when the first and second jaws **38**, **39** are brought together and the second sealing member **37** engages the package **1** in order to provide the second seal **17**. The non-heated first engagement portion **49** will thus relieve the second seal **17** while it is being formed and thus ensuring that it will not be exposed to the gas pressure which in turn minimizes the risk for a failed seal.

As also seen in FIGS. **4** and **5**, the engagement surface **41** of the engagement member **40** also comprises a non-heated second engagement portion **50** arranged for gripping the upper front portion **14** of a package (not shown) being handled in parallel with the shown package **1**. The second jaw **39** will act as an abutment also for this second engagement portion **50**.

It will be appreciated that the present invention is not limited to the embodiments shown.

For instance, the inventive apparatus may comprise a different set of stations. Also, two or more stations may be integrated in a single station. Thus, the sealing station and the gas filling station may be integrated in a single station. Further, two subsequent station may perform the same operation. Thus, the plurality of stations may comprise two filling stations and/or two sealing stations.

Several modifications and variations are thus conceivable within the scope of the invention which thus is exclusively defined by the appended claims.

The invention claimed is:

1. An apparatus for filling a pouch type package with a liquid product, the pouch type package comprising two flexible opposing side walls defining a product compartment communicating with the environment via a filling duct and a separate handle compartment communicating with the environment via a gas inlet arranged in one of the two side walls, wherein the product compartment is adapted to be filled with the liquid product through the filling duct and wherein the handle portion is adapted to be filled with gas through the gas inlet, the apparatus comprising

a plurality of stations arranged to consecutively receive and handle the pouch type package, the plurality of stations comprising

a filling station for filling the product compartment with the liquid product and comprising a filling tube insertable into the filling duct of the pouch type package,

a sealing station for sealing the product compartment after having been filled with the liquid product and comprising a first sealing member arranged to provide the pouch type package with a first seal closing the filling duct,

a gas filling station arranged to introduce gas into the handle compartment for inflation thereof and comprising a nozzle applicable over the gas inlet, and

a transfer unit comprising a gripping member for retrieving the package from the gas filling station and transferring it to a neighboring down-stream situated station, characterized by

a gas sealing unit integrated in and movable together with the gripping member of the transfer unit, the gas sealing unit comprising a second sealing member arranged to provide the pouch type package with a second seal entrapping gas introduced into the handle compartment.

2. The apparatus according to claim **1**, in which the gripping member of the transfer unit comprises a pair of jaws arranged to pinch an upper portion of the pouch type package for retrieval thereof.

3. The apparatus according to claim **2**, in which the pair of jaws of the gripping member comprises a first jaw having a thermally non-conductive engagement member, wherein the second sealing member is recessed in an engagement surface of the engagement member.

4. The apparatus according to claim **3**, in which an engagement surface comprises a first engagement portion adjoining the second sealing member, the first engagement portion being arranged to face a pressurized side of the handle compartment while the second sealing member engages the package in order to provide the second seal.

5. The apparatus according to claim **3**, wherein the transfer unit comprises an additional gripper arranged to transfer the pouch type package from a station situated up-stream or down-stream of the gas filling station to a neighboring down-stream situated station.

6. The apparatus according to claim **3**, wherein the sealing station and the gas filling station are integrated in a single station.

7. The apparatus according to claim **3**, in which each of the plurality of stations are arranged for parallel handling of a group of packages comprising at least two pouch type packages.

8. The apparatus according to claim **7**, in which the gripping member of the transfer unit is arranged to grip an upper back portion comprising said gas inlet of the package as well as an upper front portion of a package being handled in parallel.

9. A method for filling a pouch type package with a liquid product, the pouch type package comprising two flexible opposing side walls defining a product compartment communicating with the environment via a filling duct and a separate handle compartment communicating with the environment via a gas inlet arranged in one of the two side walls, wherein the product compartment is adapted to be filled with the liquid product through the filling duct and wherein the handle compartment is adapted to be filled with gas through the gas inlet, the method comprising

filling the product compartment with a liquid product at a filling station in which a filling tube is inserted into the filling duct of the pouch type package,

providing the pouch type package at a sealing station with a first seal closing the filling duct,

introducing gas into the handle compartment for inflation thereof at a gas filling station by means of a nozzle applied over the gas inlet of the pouch type package, and

providing the pouch type package with a second seal entrapping gas which has been introduced into the handle compartment at the gas filling station, characterized by transferring the package from the gas filling station to a neighboring down-stream situated station, wherein the step of providing the pouch type package with a second seal is performed by means of a gas sealing unit integrated in and movable together with a gripping member of a transfer unit during the step of transferring the package from the gas filling station to the neighboring down-stream situated station.

10. The method according to claim **9**, further comprising transferring the pouch type package with its product compartment filled with a liquid product from the filling station to the sealing station.

11. The method according to claim **9**, further comprising transferring the package from a neighboring up-stream situated station to the gas filling station.

12. The method according to claim **11**, wherein the neighboring up-stream situated station from which the pouch type package is transferred to the gas filling station is the sealing station.

13. The method according to claim **9**, wherein the neighboring down-stream situated station to which the pouch type package is transferred from the gas filling station is an output station.

14. The method according to claim **9**, wherein the second seal is provided such on the pouch type package that in extends across a third segment of the handle compartment, the third segment being arranged between a first segment of the handle compartment forming a handle in the inflated state of the handle compartment and a second segment comprising said gas inlet.

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